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CALVERT CLIFFS
NUCLEAR POWER PLANT

July 8, 2010

U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 1; Docket No. 50-317; License No. DPR 53
Licensee Event Report 2010-003, Revision 00
Reactor Trip Due to Loose Connection in Switchyard Breaker Panel Board

The attached report is being sent to you as required by 10 CFR 50.73. Should you have questions regarding this report, please contact Mr. Douglas E. Lauver at (410) 495-5219.

Very truly yours,

Thomas E. Trepanier
Plant General Manager

TET/ALS/bjd

Attachment: As stated

cc: D. V. Pickett, NRC
S. J. Collins, NRC

Resident Inspector, NRC
S. Gray, DNR

IE 22
NRR

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollect@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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4. TITLE
Reactor Trip Due to Loose Connection in Switchyard Breaker Panel Board

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	12	2010	2010	- 003 -	00	07	08	2010		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)									
10. POWER LEVEL 100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)						
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER						
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME A. L. Simpson, Principal Engineer	TELEPHONE NUMBER (Include Area Code) 410-495-6913
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	FK	DISC	1202	N					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 12, 2010 at 13:51, Unit 1 experienced an automatic reactor trip from 100 percent power, when the Reactor Protective System actuated on high pressurizer pressure due to a complete load rejection. At the time of the event, maintenance was being performed in the switchyard requiring two 500 kV breakers to be open with a third 500 kV breaker (552-22) closed, thus allowing Unit 1 main turbine generator output to the grid. However, due to a loose connection in the 125 VDC distribution panel board for the breaker disconnect switches, breaker 552-22 tripped open upon receiving a trip signal from its trip circuitry, resulting in the complete load rejection condition. The root cause of the event was a loose electrical connection in the 125 VDC distribution panel board. After the trip, one of the pressurizer safety valves leaked. The Unit was taken to Mode 5 to repair the leaking pressurizer safety valve. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A) due to a valid actuation of the Reactor Protective System. Corrective actions include checking the electrical connections in the 125 VDC distribution panel for tightness, increasing the time delay to the re-trip feature of the subject type relays, replacing the disconnect bucket and revising the risk management procedure.

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I. DESCRIPTION OF EVENT

A. PRE-EVENT PLANT CONDITIONS

Unit 1 was operating at 100 percent of rated thermal power on May 12, 2010, prior to the subject event.

B. EVENT

On May 12, 2010, at 13:51 eastern daylight time (EDT), Calvert Cliffs Nuclear Power Plant (CCNPP), Unit 1 experienced an automatic reactor trip from 100 percent power. The reactor trip occurred due to a complete load rejection when main turbine generator output breaker (500 kV Breaker 552-22) opened while breakers (552-21 and 552-23) were opened to support planned maintenance. The load rejection caused Reactor Coolant System (RCS) pressure to rise to the Reactor Protective System high pressure setpoint resulting in the reactor trip. All control rods fully inserted, there was no loss of normal heat removal, and there was no impact on Unit 2.

Both power operated relief valves (PORVs) opened as expected during the event since the PORV setpoint is equal to the high pressure reactor trip setpoint. As RCS pressure decreased, both PORVs shut as expected. However, during the subsequent pressurization of the RCS back to normal operating pressure, one of the pressurizer safety valves (1RV-201) leaked. The Unit was taken to Mode 5 to repair the leaking pressurizer safety valve. The Unit was paralleled to the grid on May 19, 2010.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT

There were no inoperable structures, systems, or components at the time of the trip that contributed to the event.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

The Unit 1 reactor trip occurred on May 12, 2010 at 13:51 EDT due to a complete load reject event.

Unit 1 was cooled down and taken to Mode 5 on May 14, 2010 to repair pressurizer safety valve 1RV-201.

Following repair of 1RV-201, Unit 1 heat up commenced on May 17, 2010.

Unit 1 was paralleled to the grid on May 19, 2010 at 04:27 EDT.

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E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED

No other systems or functions were affected.

F. METHOD OF DISCOVERY

The event was self-revealing.

G. SAFETY SYSTEM RESPONSES

The Reactor Protective System operated as required. There were no safety system functional failures.

II. CAUSE OF EVENT:

The event is documented in station condition report number CR-2010-005173. Baltimore Gas and Electric personnel were in the CCNPP switchyard performing maintenance on a highline (500 kV) transfer trip circuit. The maintenance required two 500 kV breakers to be open with a third breaker (552-22) remaining closed so as to provide Unit 1 main turbine generator output to the grid. This configuration placed the station in a single breaker trip vulnerable condition for a Unit trip. During performance of the maintenance, 500 kV output breaker (552-22) opened due to DC electrical noise (voltage spiking) that was introduced in its protective relay circuitry due to a loose electrical connection. Specifically, a loose electrical connection on the 125 VDC distribution panel board caused breaker 552-22 to open unexpectedly while closing the disconnect switch to restore 125 VDC power to one of the switchyard breakers, breaker 552-23. The disconnect switch for breaker 552-23 is physically located adjacent to the disconnect switch for breaker 552-22 in a common switch bucket. Mechanical agitation of the disconnect switch for the breaker caused voltage spikes of sufficient magnitude and duration to provide a trip signal to the digital relay for 552-22 breaker. The loose electrical connection most likely existed since original plant installation of the 125 VDC distribution panel board. Therefore, cause code B "Design, Manufacturing, Construction/Installation" most clearly describes the root cause of the failure since the failure was traced to a defective component.

III. ANALYSIS OF THE EVENT:

This event resulted in a valid actuation of the Reactor Protective System. The actuation was not part of a pre-planned sequence during testing or reactor operation. Therefore, this event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A). Immediate notification of this event (Event Number 45920) was made on May 12, 2010 at 15:35 EDT in accordance with 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(b)(3)(iv)(A).

The Nuclear Regulatory Commission Performance Indicator for Unplanned Scrams per 7,000 Critical Hours is projected to rise to approximately 1.807 and remains green. No other NRC performance indicators were impacted.

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There were no actual nuclear safety consequences incurred from this event. An estimated conditional core damage probability of 1.8E-06 and an estimated conditional large release probability of 8.5E-08 were calculated for this event.

IV. CORRECTIVE ACTIONS:

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

1. The 125 VDC distribution panel electrical connections were checked for adequate tightness.
2. All of the subject type relays in the switchyard were adjusted to add an 8 millisecond time delay to the re-trip feature.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE

1. The disconnect bucket for breakers 552-22 and 552-23 disconnect switches will be replaced with a new assembly. The assembly will be inspected prior to installation.
2. The risk management procedure will be revised to require additional risk assessment for work activities that result in single generator output breaker alignment or a high line outage.
3. Preventive maintenance tasks will be created/revised to periodically check tightness of 125 VDC distribution panel electrical connections.
4. The associated preventive maintenance tasks will be reviewed for on-line vs. off-line performance.
5. An engineering standard will be revised to ensure requirements of original equipment (analog devices) are considered when performing digital upgrades.

V. ADDITIONAL INFORMATION

A. FAILED COMPONENTS:

The event occurred due to a loose connection in the 125 VDC distribution panelboard located in Calvert Cliffs' Switchyard. The panelboard is a Vacu-Break (V-B) Fusible Panelboard manufactured by I-T-E Imperial Corporation (now Siemens).

Unit 1 was cooled down to Mode 5 to repair a leaking pressurizer safety valve (1RV-201). The subject valve is an American Society of Mechanical Engineers Boiler and Pressure Vessel Code Approved PSV designed to limit RCS pressure to a maximum of 110 percent of design

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pressure. The PSV is a totally enclosed, back pressure compensatory, spring-loaded valve. The valve is manufactured by Dresser Consolidated, Inc.

B. PREVIOUS LERs ON SIMILAR EVENTS

A review of Calvert Cliffs' events over the past several years was performed. No previous occurrences were identified involving a reactor trip due to complete load reject as the result of a loose electrical connection.

C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) COMPONENT FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM REFERRED TO IN THIS LER:

Component	IEEE 803 EIIS Function	IEEE 805 System ID
125 VDC Disconnect Switch	DISC	FK
500 kV Breakers (552-21, 552-22 and 552-23)	BKR	FK
Pressurizer Safety Valve (1RV-201)	RV	AB